The American Fertilizer

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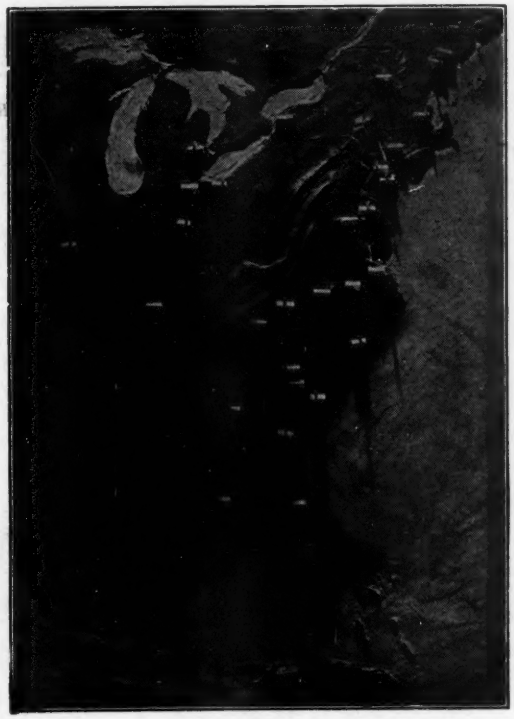

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...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

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Organic Matter

Conceptions and Misconceptions*

By FORD S. PRINCE

Agricultural Experiment Station, Durham, New Hampshire

MEMBERS of the Agricultural Profession are often criticized for their failure to make statements that are definite and specific. At least I am. In fact, my wife told me recently that she was rather sick of agricultural talks because the three principal words were if, but, and maybe.

Of course, I tried to argue with her by saying that agriculture, unlike mathematics, is a very, very young science and that when we have been figuring things out scientifically in the farming game as long as scholars have been devising devious mathematical formulas, we will be able to nail the facts to the barrel head in better shape. This was a poor explanation for her since her mathematical education hesitated at the multiplication table of twos, and she said so. And there are a great many people who feel as she does, especially if they have had less training in and association with people in agriculture and do not appreciate the vagaries of rainfall, climate, and more especially, the complex nature and functions of the soil itself.

Take soil organic matter as an example. Farmers have long recognized its worth as a soil-building component, for the application of farm manure is one of the oldest methods of soil improvement. Many writers have stated that there is a fairly direct relationship between organic matter and the nitrogen it contains and soil productivity. Yet, what rotations and cropping practices will maintain the organic matter supply of the soil? What is the relationship between organic matter depletion and soil erosion? Once depleted, how can organic matter be most quickly restored to the soil? Is it possible to greatly increase the normal supply of this substance in the soil? What is the relationship between the application of fertilizers and lime to organic matter maintenance? Why is a goodly supply necessary for soil productivity? These and many other similar questions now demand an answer in the face of the fact that our soils are wearing out and washing away and have been doing so at an accelerated rate for many years.

It is only recently that some of these questions have been answered by soil scientists. Others are doubtless in the process of solution. But it is quite apparent that the whole subject has not received enough study by research men up to the moment, and if we are to take more of the "ifs" and "buts" out of the organic matter story, more work will need to be done.

Short Rotation Tried

We started out very blithely in New Hampshire a dozen years ago by undertaking to produce potatoes in a three-year rotation with oats, and one year of clover and timothy hay. The oat crop was removed as grain or hay and the first hay crop was taken off in the hay year but the second crop was plowed under, much to the disgust of the dairymen living near the farms on which the experiments were located. At that time a three-year rotation was considerably shorter than those usually practiced with potatoes in New Hampshire.

Good hay and oat crops were produced, and there was abundant stubble and second crop to plow down as organic residue. We confidently expected that such a system would maintain the organic matter of the soil and that we could practice this rotation indefinitely

* Reprinted from "Better Crops with Plant Food," August-September, 1941.

without worry about organic matter, erosion, and related problems.

But the whole program backfired. On one field serious erosion started at the beginning of the second rotation period and the yield of potatoes was consequently reduced. Fortunately, we had sampled the soil at the beginning of the tests and were able, by analysis, to compare them with samples taken later to determine what had happened. Much to our surprise, most of the plots had lost organic matter at the rate of about 1% of the total supply in the soil each year during the test, although the net change varied somewhat with fertilizer and lime treatments. Perhaps if we had fed the oats and first cutting of hay and returned the manure to the soil the story might have been different.

I cite this instance for two reasons; one is that we made some rather definite statements about such a rotation, since we fully expected that the organic matter would at least be maintained, and further that losses of organic matter when hill land is in potatoes only one year in three may prove serious in the end.

Serious, yes, because organic matter plays such a vital role in soil functions; vital, because it is the source of much of the nitrogen that is going to be available to crops. Because its decay releases phosphoric acid, potash, and trace elements for plant growth and because of the chemical changes it undergoes, soil minerals themselves are acted upon and caused to go into solution and these, too, become a source of nutrients to plants. These things come about not because organic matter is a static substance. It could not possibly be as useful if it were. They occur because, in the soil, it is an ever-changing, dynamic material, imparting this quality to the soil itself.

Even as it approaches, in the end stages of decay, a more or less static condition, organic substance still performs its useful physical and chemical functions. By this time it has reached a colloidal state in which it functions not only in the base exchange complex, absorbing nutrients, holding them until they are utilized by plants but also assists in the build-up of soil structure, causing a rearrangement of the finer soil particles into larger groups making heavy soils more workable, permitting air to enter the soil freely, and enabling water to filter into the soil in greater quantity. Infiltration of water and water-holding capacity are vital points in preventing erosion, erosion which if unchecked will carry away the bulk of this important substance with the topsoil which is most quickly affected.

But why recount all these beneficial qualities of organic matter? They are all well recognized and rarely disputed. What is of much more concern is how the level of organic matter in the soil can be maintained so as to be most propitious for farming.

Climate Most Important

As with many phases of farming, climate not the farmer plays the most important role in determining the amount of organic matter in the soil. Dr. Jenny's work in Missouri exploded many misconceptions on this point. In this work he collected samples of soil from different climatic regions of the United States and analyzed them for organic substance. His main conclusion after his laborious experiment was that nitrogen and organic matter of soils, within regions of similar moisture conditions, decrease from North to South, and that the difference can be calculated mathematically if the climatic factors of different regions are known.

Dr. Jenny undertook his important work, he states, because in the common rotations practiced in Missouri organic matter was not being maintained. His conclusions appear to point to the fact that for each climatic condition and soil group, nature herself tends to maintain the organic matter level at a certain normal point represented by those conditions. Many farming processes work against nature in this respect and tend to reduce the organic matter supply. This undoubtedly accounts for the very serious erosion and soil depletion that have already occurred in our country and points to the need for rotations and farming practices that will maintain organic matter at such a level that soil structure will be maintained so that water can penetrate the soil and not run off the surface with destructive effects.

Even in our own State, which is 200 miles from north to south, we find a difference in the total stocks of organic matter in the soils, those in the northern part being richer in this respect. Contrast northern New Hampshire and its 100-day growing season with Florida where bacterial activity and organic decay proceed during the whole year! Workers at Gainsville, Florida, told me a few years ago that six weeks after a heavy crop of crotalaria had been plowed under, all traces of it had disappeared, so rapid was its decay there. Professor Stokes stated at that time that soil organic matter was the greatest single disturbing factor to Florida

(Continued on page 20)

Changes in Official Grades

Arkansas

At the Arkansas Grade Meeting held at Little Rock, September 25th, Dr. Wm. F. Manglesdorf, State chemist, announced the following changes in grades for the year 1941-42: 4-10-4 and 10-20-10 were omitted from the last year's list, and 0-12-6 substituted for 0-12-4. 10-6-4 and 5-12-12 were added as tentative grades for the new year. In materials, 18 per cent superphosphate was added, and 32 per cent superphosphate omitted. 22 and 25 per cent manure salts were also added to the list, and sulphate of ammonia and granular cyanamid listed as 20.6 per cent nitrogen with pulverized cyanamid at 21 per cent of nitrogen. A committee of E. E. Newhouse, T. G. Sinclair, and P. E. Bradley representing the industry, and Dr. C. F. Simmons, extension agronomist, was appointed to confer with Dr. Manglesdorf on changes in recommended grades for 1942-43. Supt. G. W. Ware, of the Fruit and Truck Experiment Station, extended an invitation to meet at Hope, Ark., sometime during 1942, and E. L. Robins was asked to help arrange a suitable meeting date for the next meeting.

Mississippi

The fertilizer conference, Biloxi, Miss., October 3, was attended by more than 80 members of the industry, representatives of the State Department of Agriculture, and of Mississippi State College, Experiment Station, and Extension Service. The meeting was called by Commissioner of Agriculture Si Corley, who presided. Charles J. Brand, of the National Fertilizer Association, spoke on "War and Postwar Problems." Director L. I. Jones, of the Extension Service, discussed the use of fertilizers in Mississippi from the Extension viewpoint, and Dr. Clarence Dorman, director of the experiment station, presented some results of recent experimental work. Charlie McNeil presided at the luncheon, features of which were a tribute to Dr. W. F. Hand, State chemist of Mississippi, and an address by Dr. G. D. Humphrey, president of Mississippi State College.

Dennis Granberry presented the report of the resolutions committee, and N. E. Harman the report of the grades committee. Grades dropped from last year's list were 4-10-7 and 8-4-6, and the 10-6-4 grade was added. Materials dropped from last year's list were calcium nitrate, Cal-Nitro, 24 per cent nitrogen, Uramon, 32 per cent superphosphate, and 20 per cent kainit. Two-element fertilizers dropped from the list were 0-12-6, 11-48-0, 16-20-0, and 14-0-14. Materials added were 22, 25, and 30 per cent manure salts. Sulphate of ammonia will be guaranteed 20.6 per cent nitrogen; granular cyanamid, 20.6 per cent nitrogen; and pulverized cyanamid, 21 per cent nitrogen.

Total sales of all fertilizers for the year ended June 30, 1941, amounted to 325,520 tons, the largest tonnage ever sold in the State. The mixed fertilizer tonnage totaled 130,162, of which 65 per cent consisted of 4-8-4 and 96 per cent consisted of the five leading grades—4-8-4, 6-8-8, 6-12-6, 4-8-8, and 6-8-4. Of the 195,362 tons of materials sold, 86 per cent consisted of nitrate of soda, sulphate of ammonia, and cyanamid.

FARM PRICES NOW ABOVE PARITY

Farm product prices are above parity. Six consecutive substantial increases in farm product prices have taken their average to the highest peak since February, 1930. In September, according to the U. S. Department of Agriculture, farm product prices exceeded, for the first time in 21 years, the average of prices paid, interest, and taxes. Prices average 43 per cent higher than a year ago, with all groups of farm products sharing in the rise.

"THE MINERAL INDUSTRY, 1940"

The 49th edition of "The Mineral Industry," giving the statistics and technical developments of the principal minerals during 1940, has been published by McGraw-Hill Book Company, New York. This volume of 778 pages is again edited by G. A. Roush and each of the individual metals and minerals is reviewed by an authority in that particular field. Of interest to the fertilizer industry are chapters dealing with phosphate rock, potash, sulphur and pyrites, sodium salts, borax and magnesium. The price of the volume remains at $12.00.

ST. REGIS PAPER CO. OPENS BALTIMORE OFFICE

Because of increased demand for heavy duty paper bags, particularly in the fertilizer industry, has made it advisable for the St. Regis Paper Company to open a sales office in the Baltimore Trust Building, Baltimore. This new office will be in charge of Burton A. Ford and will serve the territory in Maryland, Virginia, North Carolina, South Carolina, Georgia and Florida.

Superphosphate Production Continues at High Levels

Superphosphate production in August at the plants of those acidulators who report their statistics to The National Fertilizer Association was 13 per cent larger than in August, 1940 and 43 per cent larger than in the same month of 1939. The principal increase in August over last year was in the southern area, with a more moderate gain reported by northern plants.

Superphosphate Production, Shipments, and Stocks for August and January-August, 1941 and 1940

Expressed throughout in equivalent tons of 16% A.P.A. Based on reports by acidulators to The National Fertilizer Assn.†

August	United States 1941	United States 1940
Stocks—First of month:		
Bulk superphosphate	773,601	870,527
Base & mixed goods	363,858	331,807
Production:		
Bulk superphosphate	329,862	295,667
Base & mixed goods	11,258	7,726
Total Production	341,120	303,393
Other Receipts*	56,449	30,062
Book Adjustments	—5,014	—1,265
Total Supply	1,530,014	1,534,524
Shipments:		
Superphosphate:		
To mixers	82,355	83,505
To other acidulators	48,723	35,325
To consumers, etc.	53,340	39,563
Total Superphosphate	184,418	158,393
Base & mixed goods	40,028	27,905
Total Shipments	224,446	186,298
Stocks—End of month:		
Bulk superphosphate	829,326	924,023
Based & mixed goods	476,242	424,203
Total Stocks	1,305,568	1,348,226

Accumulated Production and Shipments for January-August

	United States 1941	United States 1940
Production:		
Bulk superphosphate	2,589,766	2,354,846
Base & mixed goods	84,910	91,523
Total Production	2,674,676	2,446,369
Shipments:		
Superphosphate:		
To mixers	1,048,066	979,294
To other acidulators	473,198	350,518
To consumers, etc.	825,161	605,532
Total Superphosphate	2,346,425	1,935,344
Base & mixed goods	1,173,027	1,100,712
Total Shipments	3,519,452	3,036,056

† Represents 70% of total production.
* Includes inter-company transfers.
Base includes wet and/or dry base.

Total production in the first eight months of this year was 9 per cent above the January-August period of 1940. The increase in the south was 11 per cent, compared with a 7 per cent gain in the north. In both areas production of bulk superphosphate was greater and base and mixed goods smaller. It now seems quite certain that 1941 production will be the largest in a number of years.

Total stocks failed to show a seasonal increase during August. Compared with a year earlier stocks of bulk at the end of August were down 10 per cent while stocks of base and mixed goods were 12 per cent greater. There was a slight increase in the southern area, but stocks at northern plants were lower than a year earlier. In spite of continued increases in production, total stocks of superphosphate still remain at low levels.

Shipments have shown a considerable increase over last year. In August all classes of shipments were larger in both areas. And in the first eight months of the year, shipments to consumers showed the greatest increase. In the south, total shipments amounted to 209,000 tons more than in the previous year.

North American Deliveries of Potash Salts

The American Potash Institute, Inc. announces that deliveries of agricultural potash by the four major producing companies within the continental United States, Canada, Cuba, Puerto Rico, and Hawaii during the second quarter of the calendar year, 1941, amounted to 85,147 tons of actual K_2O, equivalent to 153,372 tons of potash salts. Constituting this total were 126,271 tons of muriate, 16,238 tons of manure salts, and 10,863 tons of sulphate. In addition, deliveries for chemical uses amounted to 17,405 tons of salts equivalent to 10,791 tons of K_2O. These figures include salts of domestic origin only. Based on import records of the Bureau of Foreign and Domestic Commerce, potash imports in the form of chloride and sulphate salts during the second quarter amounted to approximately 4,290 short tons K_2O.

In terms of regional consignments, the total of 75,636 tons K_2O delivered within the continental United States for agricultural use was shipped as follows: northeastern and mid-Atlantic states 20,394 tons; southern states (including Virginia) 38,069 tons; midwestern states 16,770 tons; and west coast states 403

tons. The balance of 9,511 tons K_2O was delivered to Canada, Cuba, Puerto Rico and Hawaii.

For the first half of 1941 deliveries of agricultural K_2O amounted to 192,995 tons, equivalent to 345,884 tons of potash salts, consisting of 289,267 tons muriate; 26,216 tons manure salts; and 30,401 tons sulphate. Regional distribution on a K_2O basis was as follows: northeastern states, 41,060 tons; southern states (Virginia included) 92,863 tons; midwestern states, 38,733 tons; west coast states 2,922 tons; the remainder, 17,417 tons K_2O was delivered to Canada, Cuba, Puerto Rico, and Hawaii. In addition, deliveries for chemical uses amounted to 31,908 tons of salts, equivalent to 19,783 tons of K_2O. Imports of chloride and sulphate salts during the first half amounted to approximately 4,292 short tons of K_2O.

Potash Deliveries

(United States, Canada, Cuba, Hawaii, Puerto Rico)

	Short Tons K_2O	
	Jan.-June, 1941	Jan.-June, 1940
Muriate	171,860	96,031
Manure salts	7,365	1,175
Sulphate	12,107	4,840
Sul. pot. mag.	1,663	.....
Total agricultural	192,995	102,046
Chemical potash	19,783	17,988
Grand Total	212,778	120,034
Northeast-Middle Atlantic States	41,060	18,505
Southern (including Va.)	92,863	42,665
Mid-Western	38,733	22,769
West Coast	2,922	2,998
Canada, Puerto Rico, Cuba, Hawaii	17,417	15,109
Total Agricultural	192,995	102,046

MORE FERTILIZER USED ON COTTON

There were 1,352,000 acres less of cotton in cultivation on July 1st of this year than on the same date in 1940. In spite of this decline in acreage, however, the Department of Agriculture reports that cotton growers used 33,000 tons more fertilizer this year than last.

The relative use of fertilizer on cotton this year was at new peaks. Each year since 1932 there has been a rise in the percentage of total cotton acreage fertilized. This year 463 acres out of every thousand grown received fertilizer, a new high peak. The ratio was double that of 1932.

In addition to the rise in the percentage of acreage fertilized there has also been an upward trend in the rate of application. This year it amounted to 285 pounds per acre, when used.

As an indication of what the changes in just the last few years mean in terms of tonnage, if the 1936 rate of acreage fertilized and rate of application had prevailed this year the total amount used (on 1941 actual acreage) would have been 1,011,000 tons instead of 1,554,000 tons. Changes in fertilizer practices in five years resulted in the use of 543,000 additional tons of fertilizer.

The average cost of fertilizer per acre, when used, was $3.76 this year. That was the cost of 285 pounds. In 1928-1930 the average cost per acre was $4.17, and that brought only 263 pounds. The average price per ton this year was $5.25 below 1928-1930, and the fertilizer bought in 1941 was higher analysis, better goods, than was bought in earlier years.

EXTEND SEED LIST FOR COVER CROPS

Farmers throughout the 16 southern and east central States are being urged by the Department of Agriculture, as part of this fall's expanded cover crop program, to supplement plantings of Austrian winter peas and hairy vetch with other cover crops.

The 16 States are Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia.

In order to expand the list of seeds which may be used as conservation materials, the State AAA committees will approve additional varieties, where a supply is available. These varieties, selected from the following list, will be approved only for the areas in the 16 States where satisfactory growth may be obtained: Kudzu crowns, rye, barley, winter oats, ryegrass, crimson clover, white clover, bur clover and Hubam clover. Local announcement will be made of the seeds approved for any county.

Emphasis was also placed on two other conservation practices—the application of lime and phosphate to pastures and the building of terraces—which farmers may also perform in earning payments under the conservation program. Lime and phosphate can be acquired in practically every section of the Southern and East Central States, and terracing can be accomplished either by individual effort or by acquiring the services of approved contractors in communities where terracing projects have been set up.

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Principal Articles in This Issue

October Crop Report

A review of the production of the principal food crops makes an impressive showing this year. Wheat is expected to show the highest yield per acre on record and a production of 961 million bushels which would be above production in any past year except 1915. The crops of rice, dry beans and dry peas are all substantially larger than any previously harvested. The production of potatoes and sweet potatoes, although only about average, is probably sufficient. The aggregate commercial production of other vegetables will probably slightly exceed last year's record total. The production of the 8 principal vegetables for canning and processing will probably exceed 4,500,000 tons. Last year's output of 3,842 000 tons was the largest previously recorded. The

	Total Production (in thousands)		
		Indicated	
Crop	Average 1930-39	1940	Oct. 1, 1941[1]
Corn, all, bu.	2,307,452	2,449,200	2,625,502
Wheat, all, bu.	747,507	816,698	961,194
Winter, bu.	569,417	589,151	684,966
All spring, bu.	178,090	227,547	276,228
Durum, bu.	27,598	34,776	44,490
Other spring, bu.	150,492	192,771	231,738
Oats, bu.	1,007,141	1,235,628	1,138,843
Barley, bu.	224,970	309,235	351,522
Rye, bu.	38,472	40,601	46,462
Buckwheat, bu.	7,315	6,350	6,109
Flaxseed, bu.	11,269	31,217	31,825
Rice, bu.	45,673	52,754	57,934
Grain sorghums, bu.	84,253	121,371	152,143
Hay, all tame, ton ..	69,650	86,312	85,733
Hay, wild, ton	9,083	8,844	10,965
Hay, clover and timothy,[2] ton	24,587	29,287	25,678
Hay, alfalfa, ton ...	24,907	30,578	33,178
Beans, dry edible 100-lb. bag	13,297	16,074	18,226
Peas, dry field, bu. ..	4,371	3,812	7,817
Soybeans for beans, bu.	35,506	79,837	111,618
Peanuts,[3] lb.	1,063,374	1,734,340	1,480,280
Potatoes, bu.	370,045	397,722	374,533
Sweet potatoes, bu. .	73,208	61,998	70,147
Tobacco, lb.	1,394,839	1,451,966	1,254,396
Sugarcane for sugar, ton	4,729	4,268	5,626
Sugar beets, lb.	9,284	12,192	9,933
Broomcorn, ton	41	41	40
Hops, lb.	[4]34,784	[4]42,552	40,552
Apples, com'l crop, bu.	[4]125,310	[4]114,391	124,754
Peaches, total crop, bu.	[4]54,356	[4]54,430	69,659
Pears, total crop, bu.	[4]27,278	[4]31,622	30,907
Grapes,[5] ton	[4]2,264	[4]2,544	2,664
Pecans, lb.	64,676	88,426	84,909

[1] For certain crops, figures are not based on current indications, but are carried forward from previous reports.

[2] Excludes sweetclover and lespedeza.

[3] Picked and threshed.

[4] Includes some quantities not harvested.

[5] Production includes all grapes for fresh fruit, juice, wine, and raisins.

principal commercial truck crops show an estimated total of 6,576,000 tons, which would be 4 per cent below last year's record figure. The principal decreases from last year are in cabbage, onions, and watermelons.

Production trends vary; but it is noticeable that some of the higher priced vegetables are showing substantial increases. With the total tonnage of commercial vegetables nearly 10 per cent above the 10-year average, celery leads with 34 per cent more than the average production, followed by carrots, lima beans, asparagus, cauliflower, snap beans, artichokes, tomatoes and peppers, all of which are 15 per cent or more above average. New-crop acreages reported to date in the fall and winter vegetable producing areas in the South also show substantial further increases to 25 per cent above average. The strawberry acreage being grown for harvest next season shows a slight reduction from this season's acreage but it is 14 per cent above average.

The 1941 commercial fruit crop is now expected to exceed the record crop of 1937. The tonnage finally harvested depends considerably on how the fine prospects for oranges, grapefruit and lemons materialize for some of the young oranges now on the trees may not be picked for nearly a year. Present indications are that the total of these citrus fruits may equal the record 1940 production of nearly 142 million boxes. This would be more than a box of citrus fruit for each person in the country.

Estimates for other fruits show the second largest peach crop in 20 years, a strawberry crop about equal to the record crop of last year, about an average crop of commercial apples, rather large, but not exceptional crops of grapes, plums and cranberries, and fair crops of prunes and apricots. On a fresh fruit basis the total for all fruits (exclusive of noncommercial apples) adds to the large total of 227 pounds per capita and, with exports limited, fruits have been moving into consumption at relatively lower prices than most other farm products.

The acreage in corn is unusually small but, as husking progresses, the yield has exceeded expectations and it now seems likely to average 30.5 bushels per acre. Such a yield has been exceeded in only two seasons, 1905 and 1906. The crop is now estimated at 2,626,000,000 bushels. This would be the third largest corn crop since 1928 but only a little larger than the crops of the past 3 years. With both barley and grain sorghums exceeding previous records and oats above average, these crops, together with corn, give a total feed grain crop of 104 million tons, the largest since 1932. This production is sufficient to permit farmers to increase their flocks and herds the six per cent that seemed to be indicated during the summer and to feed fairly liberally as in other years of large supplies without reducing the large reserves of grain carried over from last season. However, the reports of grain on farms and the records of milk and egg production would seem to indicate that farmers are feeding heavier than in any recent year.

MAGNESIUM METAL FROM FERTILIZERS

According to an announcement by RFC, magnesium metal will soon be produced as a by-product from the output of the Union Potash & Chemical Co. potash mines at Carlsbad, N. Mex. In the refining of Sylvinite and langbeinite to produce fertilizer potash salts. a quantity of magnesium chloride is recovered as a waste product. The company is now dehydrating this latter material and shipping it to its plant at Austin, Texas, where cheap power from two new dams will run a metallic reduction plant. By using either the Dow process or the Magnesium Electron (British) process, magnesium metal for defense products will be recovered.

USE OF FERTILIZER IN WINTER GRAINS

Use of fertilizer not only to increase yields but to guard against winter freezing of small grains is strongly recommended by the Missouri College of Agriculture in a recent release. In many demonstrations conducted by the Soils Department throughout the State, wheat without treatment produced less than 5 bushels per acre, while that receiving fertilizer produced from 15 to 30 bushels. They state that on soils that have been limed and legumes grown, grades such as 0-20-10, 0-14-7, or 2-12-6 will give profitable increase over superphosphate alone. Where wheat or barley follows a heavy feeding crop such as corn, kafir, or soybeans, it is profitable to use a mixture such as 4-10-6 or 4-12-4. Where no lime has been supplied and few legumes grown, 150 lbs. 20 per cent superphosphate or its equivalent is suggested.

Fertilizer sales in Texas, compiled by Dr. G. S. Fraps, State chemist, for the season ended September 1, 1941, are 129,578 tons. Sales this season are about 11 per cent higher than last season.

September Tag Sales

FERTILIZER sales in September, as measured by the sale of tax tags in 17 states, were moderately below the corresponding month of recent years. Total sales amounted to 204,000 tons, compared with 243,000 tons in September, 1940 and 222,000 tons in September, 1939.

Aggregate sales in January-September 1941 exceeded January-September, 1940 by 6 per cent.

September sales in eight of the twelve southern states were larger this year than last. These increases, however, were more than offset by declines in the other four states, particularly in Florida. September sales in the South are seasonably low, but year to year changes for the month are not particularly significant.

September sales are relatively more important in the midwest, because of the winter wheat crop, than they are in the south. Total sales for the month in the five midwestern states were considerably smaller than a year ago. August sales had been somewhat larger than last year, but the total for the two months shows a decline from 1940. For the year to date, however, total midwest sales have been 8 per cent larger than in the same period of 1940.

FERTILIZER TAX TAG SALES

State	September				January-September			
	1941		1940	1939	1941		1940	1939
	Per Cent of 1940	Tons	Tons	Tons	Per Cent of 1940	Tons	Tons	Tons
Virginia	114	44,116	38,566	54,263	103	362,194	352,387	383,890
N. Carolina	93	19,222	20,620	24,439	102	1,014,873	996,445	1,133,394
S. Carolina	103	5,040	4,910	6,130	105	677,587	643,484	645,044
Georgia	160	5,513	3,456	5,310	105	751,634	718,119	671,512
Florida	68	32,665	47,703	41,999	113	433,516	382,364	345,485
Alabama	42	1,800	4,250	1,850	100	565,000	566,300	549,150
Mississippi	168	1,675	1,000	0	110	323,617	294,295	277,846
Tennessee	23	1,363	6,018	1,120	99	128,338	129,891	117,799
Arkansas	175	350	200	250	120	113,100	93,950	65,622
Louisiana	130	11,600	8,900	11,460	113	160,510	142,431	137,188
Texas	177	11,095	6,258	7,328	118	129,226	109,839	88,337
Oklahoma	106	800	755	264	160	10,600	6,608	6,667
Total South	95	135,239	142,636	154,413	105	4,670,195	4,436,113	4,421,934
Indiana	73	32,939	45,406	28,450	111	332,537	299,350	256,958
Illinois	101	7,162	7,100	2,550	125	59,608	47,760	38,637
Kentucky	86	9,235	10,695	9,123	99	114,112	114,884	111,229
Missouri	54	15,539	29,019	22,064	102	86,039	84,599	64,081
Kansas	49	3,925	7,988	5,440	107	17,786	16,671	14,066
Total Midwest	69	68,800	100,208	67,627	108	610,082	563,264	484,971
Grand Total	84	204,039	242,844	222,040	106	5,280,277	4,999,377	4,906,905

FERTILIZER MATERIALS MARKET

NEW YORK

Little Change in Market. Chemical Materials Still Scarce. New Prices on Nitrate of Soda Expected Shortly. Organic Market Quiet But Firm.

Exclusive Correspondence to "The American Fertilizer."

NEW YORK, October 7, 1941.

There has been no change in chemical fertilizers. Sulphate of ammonia continues tight, and in most cases deliveries against contracts are somewhat behind. Nitrate of soda is moving, and orders are being placed for October shipments in anticipation of new prices which are expected for shipments starting November 1.

One of the larger manufacturers of triple superphosphate has now announced new prices for 1942, and it is understood that many of the buyers are covering their anticipated requirements promptly. From present indications, there will be a scarcity of this material for at least the first four months of the new year, with the probability that buyers who do not contract for their later requirements promptly may find the situation in the latter months of 1942 the same as it is at present. That is, material extremely scarce and practically unobtainable unless ordered against contracts previously made.

Potash salts continue scarce, but the situation is somewhat relieved by the arrival of some imported material.

Nitrogenous

There has been no change in this market.

Fish Scrap

This item continues to be quite strong in tone. There are practically no offerings in the market, but the nominal price is $5.00 ($6.08 per unit N) and 10 cents bulk basis, f.o.b. fish factory. The fishing season is, of course, practically near the end, and it is expected that the market will remain strong with the tendency upward.

Blood

This market remains somewhat on the quiet side. Last business has been done at $4.25 ($5.16½ per unit N), f.o.b. New York. South American material is offered at the same basis for northern ports, and at $4.35 ($5.29 per unit N) at southern ports.

Tankage

This item is likewise set, but on the quiet side, neither buyers nor sellers pressing for business. Market is at $5.10 ($6.20 per unit N), but there are little, if any, offerings.

BALTIMORE

Fall Season Hampered by Continued Drought. No Sulphate of Ammonia on the Market. Arrival of Nitrate Shipment Expected.

Exclusive Correspondence to "The American Fertilizer."

BALTIMORE, October 7, 1941.

The unprecedented dry spell continues, and as a consequence the fall season continues to lag. In the meantime, there is very little interest being shown in supplies by manufacturers.

Ammoniates.—Ground animal tankage is entirely out of the class of fertilizer material, and the market for feeding purposes continues at about $5.50 per unit of nitrogen and 10 cents per unit of B.P.L., f.o.b. Baltimore. Ground dried blood is further marked up to the equivalent of $4.80 per unit of nitrogen, c.a.f. Baltimore.

Nitrogenous Material.—Offerings are at a minimum and the demand is practically nil. The nominal market is unchanged at around $4.00 per unit of nitrogen, f.o.b. Baltimore.

Sulphate of Ammonia.—There is no change in the situation and no resale offerings on the market. Some of the manufacturers have still not been able to secure their entire requirements and, unless conditions change, many of them will be dependent on nitrate of soda for the source of their mineral ammonia during the coming spring season.

Nitrate of Soda.—While there are no stocks on hand at the present time, there is an

arrival of the Chilean product expected the latter part of the month. The market for October delivery on the imported product is unchanged at $33.00 per ton in 100-lb bags; $32.40 in 200-lb. bags and $30.00 in bulk, f.o.b. port warehouse. Domestic nitrate is priced at $30.05 in 100-lb. bags; $29.35 in 200-lb. bags and $27.00 in bulk, f.o.b. ports or producing points.

Fish Scrap.—With the fishing season on the Chesapeake Bay drawing to a close, the market continues firm and slightly higher, being in the neighborhood of $5.50 per unit of nitrogen and 10 cents per unit of B.P.L., f.o.b. fish factories, in bulk, for shipment "if and when made." Fish meal guaranteed 60 per cent protein continues to be quoted at $66.00 per ton, in 100-lb. bags, f.o.b. Baltimore.

Superphosphate.—There has not been any change in the situation and the market on this product is still quoted at $9.50 per ton of 2,000 lb., basis 16 per cent, for run-of-pile, and $10.00 for flat 16 per cent grade, both in bulk, f.o.b. Baltimore. The market is firm on this basis, and any change in the shipping situation in rock and/or sulphur would naturally affect the market on superphosphate.

Bone Meal.—The demand is very quiet at this time of the year, and the market continues unchanged, with 3 and 50 per cent steamed bone meal quoted at $37.50 to $38.00 per ton of 2,000 lb., while 4½ and 47 per cent raw bone meal ranges from $37.50 to $38.00 per ton of 2,000 lb:. f.o.b. Baltimore.

Potash.—There is no change in the market, but practically all producers are sold up and not taking on additional business.

Bags.—The burlap market has been stationary during the past two weeks, and plain, new 10-oz. bags for fall delivery are still quoted at $191.00 per thousand, basis 40 cut, 54 in., with spring deliveries ruling approximately $1.00 per thousand lower.

WILMINGTON

Market Extremely Quiet. High Prices Quoted on Materials with Buyers Showing No Interest.

Exclusive Correspondence to "The American Fertilizer."

WILMINGTON, October 6, 1941.

There is almost a total absence of trading in the fertilizer material markets here. Fishing continues poor and no scrap is being offered from producers' plants.

Cottonseed meal is being quoted at very high prices. As a result, the fertilizer industry is showing decidedly little interest.

To sum up the situation here, we will say that industry seems very much more concerned with the fate of the Brooklyn Dodgers than with the trend of the fertilizer material market.

CHARLESTON

Most Organic Materials Continue Scarce with Prices High. Cottonseed Meal Prices Lower.

Exclusive Correspondence to "The American Fertilizer."

CHARLESTON, October 7, 1941.

A shipment of Chilean nitrate of soda has been discharged at Wilmington and also at Charleston.

Nitrogenous.—This continues to get more scarce, with few sellers. Quoted around $3.00 ($3.64½ per unit N), delivered southeastern ports.

Blood.—This continues to get scarce. The last sale reported was at $4.15 ($5.04½ per unit N), bagged, c.i.f. where freight can be obtained. Bulk is quoted at $4.50 ($5.47 per unit N), f.o.b. Chicago.

Fish Scrap.—Dried menhaden has been sold at $4.75 ($5.77½ per unit N) and 10 cents, f.o.b. Baltimore.

Cottonseed Meal.—This market has reacted

further. The 8 per cent grade is selling at $42.00 per ton, Atlanta; $37.50 to $38.50 at Memphis.

Superphosphate.—There are few sellers of this in the southeast.

TENNESSEE PHOSPHATE

Rain Breaks Drought and Improves Crops and Mining Conditions, But Lower Grade Rock Will Have Greater Use. Monsanto Promotes Williams.

Exclusive Correspondence to "The American Fertilizer."

COLUMBIA, TENN., October 6, 1941.

A little more water is noticeable in the creeks from the few rains that have cooled the air and freshened the pastures some, but the phenomenon of a serious fall drought, following an equally serious spring one, is still quite in evidence as far as water for power development and for washing phosphate is concerned. The large stocks of washed phosphate visible at the various plants is rapidly dwindling so that it is almost a certainty that the end of the year will find lower stocks on hand of all grades than has existed for many years. Rapidly advancing costs, with increased difficulty in both selective mining and efficient washing, increase the prospect of all companies in the field having to lower their quality of production so that very little 33 per cent P_2O_5 will be sold, the high grade will likely be from 30 to 32 per cent and the low grade from 27 to 29 per cent. This will not cut so much figure with the acidulating trade, as the washing and flotation processes so reduce the iron and alumina content that even as low as 29 to 30 per cent can be acidulated, where 33 or better was required. If the war continues, more ground rock will be used on account of shortage of sulphuric acid.

His many friends in this section are congratulating Felix Williams on his promotion to the position of manager of the entire phosphate department of Monsanto Chemical Co. Mr. Williams who has been manager of the local plant, will have charge of the company's plants at Anniston, Ala., St. Louis, Detroit and elsewhere. Particularly gratifying is the fact that he will continue to maintain his headquarters and residence in Columbia, as he has taken a very prominent part in the civic and social life of the community. His position as local plant manager will be filled by the promotion of A. Beauregard, who has been assistant plant manager since the local plant was started.

CHICAGO

Fertilizer Organic Market Inert But Greater Activity Expected Shortly. Feed Materials Reach Record Levels.

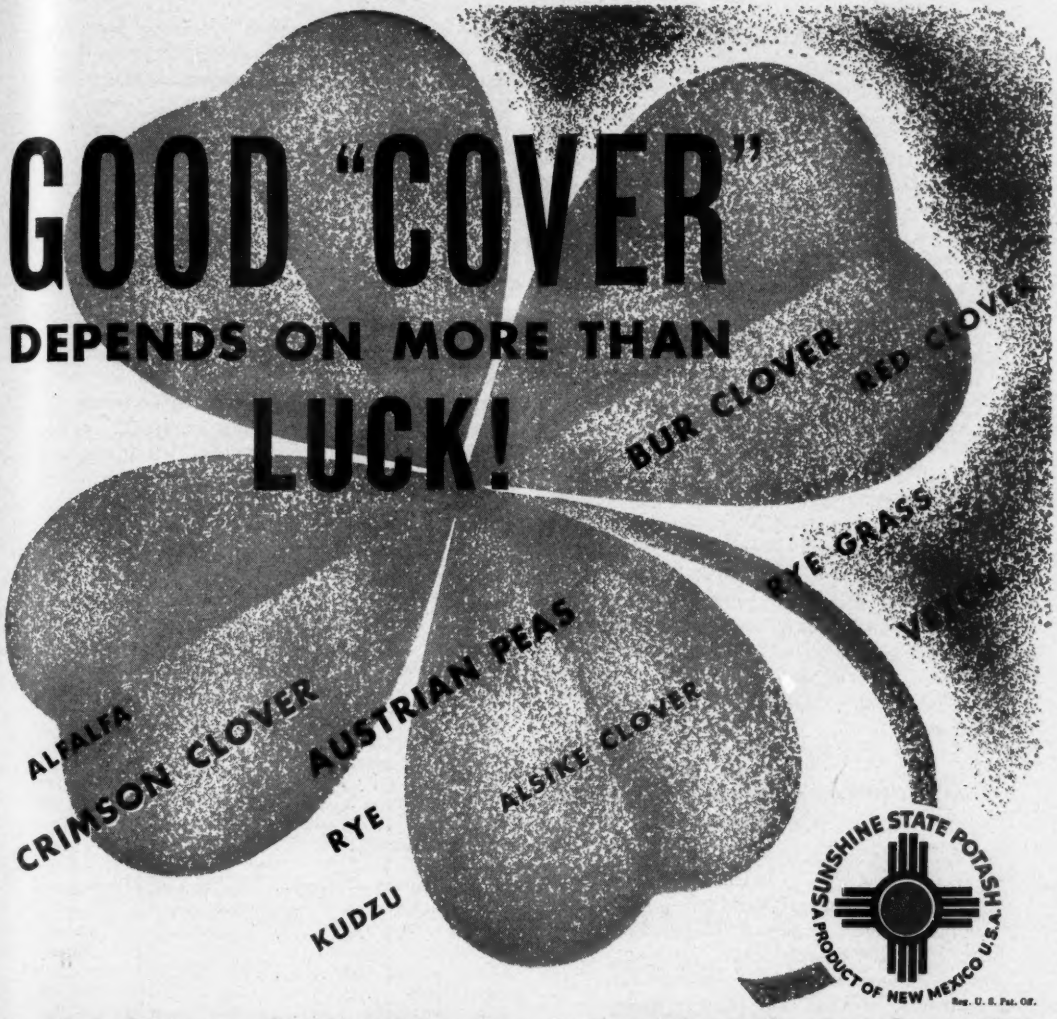
Exclusive Correspondence to "The American Fertilizer."

CHICAGO, October 6, 1941.

The organic market has turned quiet again, but sellers express the belief this is but the "calm before the storm." This opinion is largely based upon the scarcity of other ammoniates, and this should have some bearing on the organic market. Demand for steamed bone meal has dwindled, but supply is light and therefore asking prices are unchanged.

A very active and firm market in feed has resulted in tankage and blood prices reaching peaks not touched in several years.

Nominal prices are as follows: High-grade ground fertilizer tankage, $3.50 to $3.75 ($4.25½ to $4.56 per unit N) and 10 cents; standard grades crushed feeding tankage, $5.50 to $5.65 ($6.69 to $6.86½ per unit N) and 10 cents; blood, $4.50 to $4.65 ($5.47 to $5.65 per unit N); dry rendered tankage, $1.10 to $1.20 per unit of protein, Chicago basis.



Include Plenty of "Sunshine State" Potash in the Fertilizer Mix

• With the new emphasis placed in recent years upon cover crops in maintaining and improving soil fertility, has come an increasing realization of the wisdom of fertilizing these crops. Fertilizers help cover crops to make good growth and better accomplish their purpose of covering and protecting the soil, supplying humus, and in the case of legumes, fixing nitrogen from the air. Also plant nutrients turned under in the cover crop are made effectively available to following crops.

The more manufacturers feature fertilizers for cover crops containing the right proportion of potash, the greater service they are doing to the farmers who use their products, and the more new business they are creating for themselves. The value of potash in connection with soil-building crops is being demonstrated throughout the country, and potash as recommended by local agricultural authorities should be included in the mix.

Many manufacturers specify "Sunshine State" Potash because it can be depended upon for uniform analysis and easy blending.

Higrade Muriate of Potash: 62/63% K_2O • Also 50% K_2O Grade
Manure Salts: 22% K_2O Minimum

UNITED STATES POTASH COMPANY, Inc. 30 Rockefeller Plaza, New York, N. Y.

PHILADELPHIA

Shortage of Fertilizer Organics Due to Feed Demands. Prices Out of Fertilizer Range.

Exclusive Correspondence to "The American Fertilizer."

PHILADELPHIA, October 8, 1941.

There is a decided shortage of organics and indications are that prices will shortly go beyond reach of the fertilizer industry. Feed manufacturers appear to be taking on all offerings of tankage and blood as they appear on the market.

Sulphate of Ammonia.—Practically unobtainable.

Nitrate of Soda.—Importers schedule holds until end of month.

Dried Blood.—Sellers now holding at $4.50 ($5.47 per unit N), f.o.b. producing plant.

Tankage.—Sales of unground tankage have been reported at $5.00 ($6.08 per unit N) and 10 cents, and producers ideas have since been advanced.

Bone Meals.—Feeding grade very scarce with small lots being quoted at $48.50, f.o.b. The 3 and 50 per cent fertilizer grade is held at $37.50.

Potash Salts.—Indications point to a shortage.

AGRICULTURE MOBILIZED FOR DEFENSE.

The recent announcement by the Secretary of Agriculture that American agriculture will be called upon to adjust production to needs for national defense marks the first time in the history of this country that "production goals for all essential farm commodities have been established." What the program means to the farmer is that he will be asked to hold production of some products in check while increasing supplies of others.

The important crops which will be held in check are wheat, cotton, and tobacco. Supplies of these crops are believed to be more than adequate but prices will be maintained by means of commodity loans at 85 per cent of parity.

According to the United States Department of Agriculture the food most urgently needed is milk. In order to improve strength and health in this country we need to consume more milk. Vast quantities of cheese, evaporated milk, and dried skim milk will also be required by the British. In terms of crops our increased milk output will require more hay and pastures and particularly more legume crops to serve the dual purpose of providing feed for the cattle and a substitute for nitrogen fertilizer which it is reported may be scarce next year. Other foods such as poultry, meats, and vegetables will be required in greater volume. The acreage devoted to feed crops will have to be adjusted in line with the increased requirements and live-stock production.

These demands upon agriculture are coming at a time when labor is scarce, and an increase in production will have to be accomplished with fewer farm workers. There probably has never been a time when it was more important for our farmers to follow the most efficient methods of production, utilizing to the fullest farm management practices which will result in maximum production with minimum labor. The importance of fertilizers in such a program is self-evident. With the improvements in farm purchasing power and a better ratio between farm prices and prices paid by farmers, fertilizer use which has been profitable in the past promises to be even more profitable in the immediate future.—*Potash News Letter.*

EXPORTS AND IMPORTS

Exports and Imports of Fertilizers and Fertilizer Materials—Long Tons

	January-July		
EXPORTS	1941	1940	1939
Nitrogenous materials	81,046	147,851	71,865
Phosphate rock	479,544	272,237	657,941
Other phosphate materials	68,889	94,836	54,857
Potash salts	40,564	18,563	73,803
Other fertilizers	12,094	23,748	8,663
Grand Total	682,137	557,235	867,129
IMPORTS	1941	1940	1939
Sodium nitrate	306,485	483,090	416,335
Other nitrogenous materials	197,616	213,210	282,866
Phosphate materials	50,356	48,172	61,324
Potash salts	27,257	214,918	128,908
Other fertilizers	40,070	29,922	42,023
Grand Total	621,784	989,312	931,456

ORGANIC MATTER

(Continued from page 6)

farming and indicated, too, that they had come to the belief that the best farmer was the one who had the most weeds in his corn at the end of the season to form a source of organic matter for the next crop.

Organic Matter Losses

Unfortunately it is much easier to deplete the organic matter than to build it up. Dr. Jenny's work indicates this fact, and the point has been emphasized by other workers. Furthermore, with the climatic or temperature factor in mind, it appears much easier, once the organic matter supply has been reduced, to restore it to the level which represents the norm for the climate, than it is to build it up above that level, for additions over and above that point are subject to undue losses. It is easy to work against nature in one direction, but very difficult to overpower her efforts in the other.

Some idea of the losses that do occur to organic matter after it is applied to the soil may be gained from the work of Salter and Green in which they studied the soils of the long-time fertility plots at the Ohio Experiment Station. In one series of plots, seven tons of manure per acre were applied annually. Over a period of 32 years, 46,400 pounds of organic carbon were applied in the manure, but at the end of that time the soil was richer only by about 5,000 pounds of organic carbon. This represents a loss of nearly 90% of the organic matter of the manure.

However, this isn't a cause for worry, since part of the value of the organic substance lies in the fact that it does decay. The data do serve to emphasize the extremely rapid rate of loss and the handicap under which a farmer works in building up the supplies in his soil.

The same authors present other valuable information on the influence of continuous cropping and rotations in relation to organic matter losses. Corn grown continuously caused the most loss, followed by wheat and oats in continuous culture, while losses in a five-year rotation of corn, oats, wheat, clover, and timothy were slightly greater than in a three-year rotation of corn, wheat, and clover. The slightly better results in the three-year rotation are attributed by these authors to the clover, and they state that it appears better from the rotation point of view to have two crops of clover in six years rather than one crop of clover followed by one of timothy in a five-year rotation.

In all of this work the destructive effects to organic matter with continuous culture to any crop are emphasized, and this fact is well worth repeating to Northeast potato and vegetable growers who attempt rotation practices that even approach a one-crop system. Sooner or later they get into trouble and the nearer the approach to the one-crop system, the sooner it is.

Some work at Illinois which is reported by R. S. Stauffer shows how, under conditions there, the organic matter level fluctuates with different cropping and fertilizer systems in comparison with land in permanent sod. In this report, continuous corn, without fertilization, was the worst offender, but losses in organic matter occurred even when corn grown continuously was manured, limed, and fertilized with rock phosphate. In an unfertilized three-year rotation of corn, oats, and clover, losses occurred, but where this rotation was manured limed, and fertilized, the organic matter level was raised above that of nearby sod land. Stauffer found a direct correlation between the organic content of these soils and their water-holding capacity.

Wheeting's work in Washington points to manuring and fertilizing as being important in building up the stocks of organic soil substance.

A bright, new chapter

in America's Declaration of Potash Independence

MURIATE OF POTASH
60% K_2O

MURIATE OF POTASH
50% K_2O

Granular
MURIATE OF POTASH
50% K_2O

MANURE SALTS
30% K_2O

SULPHATE OF POTASH
90/95% K_2SO_4

SUL-PO-MAG
America's Own
Sulphate of
Potash-Magnesia
40% K_2SO_4 18.50% MgO

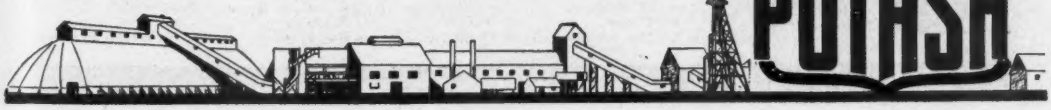
OCTOBER 1, 1941, marked the first anniversary of the shipment of potash by Union Potash & Chemical Company, of Carlsbad, New Mexico. The swift, efficient development of this modern mining operation represents the climax of many years of effort to make America independent of foreign potash.

Potash, for use in the manufacture of fertilizers, became almost unobtainable at any price when the first World War cut off foreign imports. The yield and quality of crops suffered and America's food supply was threatened.

The situation is far different today. Over a period of years, America has gradually increased its production of some grades of potash. With Union Potash & Chemical Company now in volume production, *as the only American company producing a complete line of all grades of potash,* the scales have been balanced in America's favor and the dream of potash independence has been realized.

UNION POTASH & CHEMICAL COMPANY, Inc.
20 North Wacker Drive, Chicago, Ill.
61 Broadway, New York, N. Y. • Volunteer Bldg., Atlanta, Ga.

UNION POTASH



In this work, rotation or farming land was compared with stump pasture or cutover land which had been subjected to slash burning. In two comparisons, one of which concerned itself with a manured rotation and the other in a heavily-fertilized, vegetable-growing system, the organic content was higher in the cropped than in the nearby pasture or cut-over land, while in the third rotation system in which fertilizers or manures were not used, the organic content was lower after many years of farming than in nearby cut-over land. Manure and fertilizers that increase crop residues do, of course, tend to counteract the depleting effects of cropping systems.

With all the emphasis that is being placed upon pasture top-dressing in the Northeast, it is interesting to note the effect of fertilizers upon the organic matter content of sod land. Seitz, at the Virginia Polytechnic Institute, reports a study of pasture soils top-dressed with 200 pounds of 16% superphosphate annually since 1917 and 1933 respectively, and in comparison with untreated sod land these soils gained 95% and 55% in organic matter. This denotes an increase of roots in the soil, and such increase would undoubtedly be in fairly direct proportion to the pasture yields. Any system of top-dressing, therefore, which increases pasture yields will probably show a gain in soil organic matter, and in the Northeast, in most locations, a complete fertilizer would give quicker results than superphosphate alone. This excellent report causes us to wonder how much the depleted organic matter supply of these old pasture soils is responsible for low forage yields where the land has been untreated for a long time.

Seitz also finds a direct correlation between organic matter and soil structure, noting an increase of 21% in water-stable soil aggregates in the soil treated since 1917 and a 19% increase in that treated since 1933. The fact that the increase in water-stable aggregates is not in direct proportion to the increase of organic matter probably indicates that the optimum conditions for structure development are reached long before the soil reaches its possibilities in relation to organic content as affected by treatment.

Smith, Brown, and Russell have investigated organic content in relation to infiltration capacity and they conclude that soils high in organic matter may have an infiltration rate double that of soils with a low organic content. This infiltration capacity of the soil has been shown by many workers to have a direct bearing on erosion, since the amount of water that runs off a field is directly responsible for erosion and conversely, the more that soaks into or infiltrates into the soil, the less erosion will occur.

In view of this fact, it is easy to see why soils cannot be farmed to cultivated crops indefinitely without erosion troubles, and apparently that is what has happened over a wide area in the United States, explaining the reasons why our attention is focused upon erosion today more than ever before.

And now, before I stop, I want to make some of those definite statements I spoke of in the beginning, for it seems to me, in spite of the need for more information, some of the facts in relation to organic matter are quite apparent.

One of these is that crop rotation in and by itself does not supply an adequate method of maintaining organic matter. Manuring, liming, and fertilizing, with a suitable rotation of crops, will tend to maintain or increase it.

Except for permanent grasses and clovers, there is no one-crop system that will maintain organic matter. Continuous cropping to corn, potatoes, or other cultivated crops will almost certainly deplete the organic matter supply and cause erosion and other soil troubles. Continuous cropping to small grains is not so destructive of organic matter as continuous corn, for example, but even these crops require other soil-building processes if organic matter is to be maintained.

Even with sod crops, such as are found in permanent pastures, an effort must be made to maintain fertility if the organic supply is to be kept up. Good hay crops, with their bulky residues and root systems, tend to conserve organic matter in a rotation in which they are

See Page 4

included. This serves to emphasize one of the good and one of the bad points of New England and Northeastern farming. Long rotations, in fairly fertile hay fields (and especially on dairy farms where abundant manure is used on the land), tend to conserve organic matter. But the long neglected pastures have undoubtedly suffered because of depleted organic supplies, since no adequate effort has been made to build up their fertility.

With all these facts in mind it would seem that the potato and vegetable growers of New England have on their hands a difficult problem of maintaining organic matter. And many of them know it because of the accelerated erosion they are now encountering. Some of them have already been forced to construct terraces and adopt contour farming practices and other methods of combating erosion. Even with these aids, yields of crops will suffer without organic maintenance, hence longer rotations with sod crops, the use of more land to spread out their operations, and the adoption of green manuring practices are indicated. Some growers may even court the idea of keeping a few cows.

Even with practices that are entirely desirable, natural forces come into play to prevent a build-up of organic matter above the norm for the climate and soil. Fortunately for the Northeast, this norm is relatively high anyway, and when farmers learn to approach it, less trouble will be experienced. But trouble does occur here just the same as it does in the Midwest and South when soils are mismanaged.

October Cotton Report

A United States cotton crop of 11,061,000 bales is forecast by the Crop Reporting Board of the United States Department of Agriculture, based on conditions as of October 1, 1941. This is an increase of 351,000 bales from the forecast as of September 1, and compares with 12,566,000 bales ginned in 1940, 11,817,000 bales in 1939, and 13,246,000 bales, the 10-year (1930-39) average. The indicated yield per acre for the United States of 234.2 pounds compared with 252.5 pounds in 1940, 237.9 pounds in 1939, and 205.4 pounds, the 10-year (1930-39) average.

Most of the increase in prospective production since September 1 occurred in the States adjoining the Mississippi River and in Alabama. In these States dry weather and high temperatures checked weevil activities and caused rapid development of the crop. Improvement also was shown in Oklahoma due to moderate rains. In Texas, excessive rains have reduced prospects 88,000 bales and in Louisiana, some deterioration resulted from excessive rainfall during late September.

In north Texas and Oklahoma, the crop is later than usual, and in this area serious losses would result in case of early frosts or freezes.

Census report shows 4,713,227 running bales (counting round as half bales) ginned from the crop of 1941 prior to October 1, compared with 3,923,172 for 1940 and 6,682,066 for 1939.

State	Production (Ginnings)[1] 500 lb. gross wt. bales: Average, 1930-39 1,000 bales	1940 Crop 1,000 bales	1941 Crop Indicated Oct. 1 1,000 bales
Missouri	292	388	435
Virginia	33	25	23
N. Carolina	629	739	530
S. Carolina	824	966	400
Georgia	1,132	1,010	624
Florida	32	21	15
Tennessee	465	509	550
Alabama	1,145	779	815
Mississippi	1,585	1,250	1,500
Arkansas	1,281	1,501	1,510
Louisiana	703	456	335
Oklahoma	750	802	710
Texas	3,766	3,234	2,800
New Mexico	100	128	115
Arizona	159	195	210
California	333	545	470
All other	16	18	19
UNITED STATES	13,246	12,566	11,061
Sea Island[2]	...	4.0	3.2
Amer. Egyptian[2]	17	33	74
Lower Calif. (Old Mexico)[3]	38	60	92

[1] Allowances made for interstate movement of seed cotton for ginning.

[2] Included in State and United States totals. Sea Island grown principally in Georgia and Florida. American Egyptian grown principally in Arizona.

[3] Not included in California figures, nor in United States total.

Strawberries Must Eat*

Even some of the so-called "minor" crops can be classed in the bracket of "big business" . . . offering important markets for fertilizer.

Take strawberries: They are grown on approximately 180,000 acres in various parts of the country, with a crop value at the farm of $30,000,000.

Of the three major factors determining strawberry profits . . . two are influenced by soil fertility. These three factors, brought to light by a comprehensive study and published in Michigan Agricultural Experiment Station Technical Bulletin No. 162, are as follows: 1. Large yields per acre. 2. Selling price. 3. Soil, its preparation and proper management.

Point 2 is largely beyond the grower's control, but points 1 and 3 are at least partially dependent upon proper fertilization.

Concerning the soil, the report says: "A sandy or gravelly loam in good physical condition, with abundant humus, moderately fertile and well drained is considered to be the ideal soil for strawberry production."

The question of fertilization is rather a controversial one, as should be expected because of the greatly varying conditions in different parts of the country.

With reference to the South Atlantic and Gulf Coast regions, we refer to Farmers' Bulletin No. 1026 of December, 1940, from which we take most of the following discussion.

In general the Coastal Plain soils of the Atlantic Coast States need large quantities of fertilizer because they are severely leached and rather infertile.

Experiments carried out in North Carolina show that nitrogen is the most important plant food element in strawberry fertilizers. It may be applied to the fields from September to January. Because of differences in availability "it would appear that a fertilizer with a content of 3 to 5 per cent nitrogen, part of which is from mineral sources and part from organic sources, would be satisfactory."

"In experiments in Eastern North Carolina, applications of 60 lb. of nitrogen per acre, half derived from inorganic fertilizer (nitrate of soda and sulphate of ammonia) and half from organic sources (cottonseed meal and tankage), increased yields for three years an average of 95 per cent (3,144 quarts)."

"Experiments made so far indicate that at least half of the nitrogen should be from organic sources."

For average conditions in Eastern North Carolina, about 1,500 lb. per acre of a mixed fertilizer should be applied in two applications. Potash and phosphorus should be worked into the soil.

In Florida, about 1,500 lb. of a fertilizer containing 5 per cent nitrogen is applied in part ten days before or after planting and in part in later side applications.

In Farmers' Bulletin No. 1028, in which strawberry culture in the Eastern United States is described, the following recommendations regarding Maryland, New Jersey and Virginia are found:

"However, further north along the Atlantic Coast nitrogen is often deficient and applications of a mixture of organic and inorganic sources of nitrogen up to and equivalent to 60 lb. of nitrogen per acre applied about August 15th in Maryland and New Jersey, and about September 1st in Virginia are suggested."

A judicious application of dolomitic limestone as source of calcium and magnesium is often profitable and advisable.

* From the "Organic News Letter" published by the Organic Nitrogen Institute.

BUYERS' GUIDE

A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, Including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Company, The, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Company, The, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMONIUM NITRATE SOLUTIONS
Barrett Company, The, New York City

AUTOMATIC ELEVATOR TAKEUPS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Paper
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG PILERS
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Dickerson Co., The, Philadelphia, Pa.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

A Classified Index to Advertisers in "The American Fertilizer"

BUYERS' GUIDE

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BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CHEMICALS—Continued
Huber & Company, New York City.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City.

CONTACT ACID PLANTS
Chemical Construction Corp., New York City.

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
Chemical Construction Corp., New York City.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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DISINTEGRATORS
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DRYERS—Direct Heat
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago.

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Co., Columbus, Ohio
International Agricultural Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.
Jeffrey Manufacturing Co., The, Columbus, Ohio.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Power Transmission
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping
Atlanta Utility Works, East Point, Ga.
Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MANGANESE SULPHATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Agricultural Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGEN SOLUTIONS
Barrett Company, The, New York City

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., Wilmington, Del.
Huber & Company, New York City.
International Agricultural Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Charleston Mining Co., Inc., Richmond, Va.
Huber & Company, New York City.
International Agricultural Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting
Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Agricultural Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
Union Potash & Chemical Co., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

ROUGH AMMONIATES
Bradley & Baker, New York City.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

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SCALES—Including Automatic Bagging
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SCRAPERS—Drag
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

SCREENS
Atlanta Utility Works, East Point, Ga.
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Including Vibrating
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHAFTING
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Jeffrey Manufacturing Co., The, Columbus, Ohio.
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Company, The, New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Hydrocarbon Products Co., New York City.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

SULPHUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Freeport Sulphur Co., New York City.
Texas Gulf Sulphur Co., New York City.

SULPHURIC ACID
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
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Huber & Company, New York City.
International Agricultural Corporation, Chicago, Ill.
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Schmaltz, Jos. H., Chicago, Ill.
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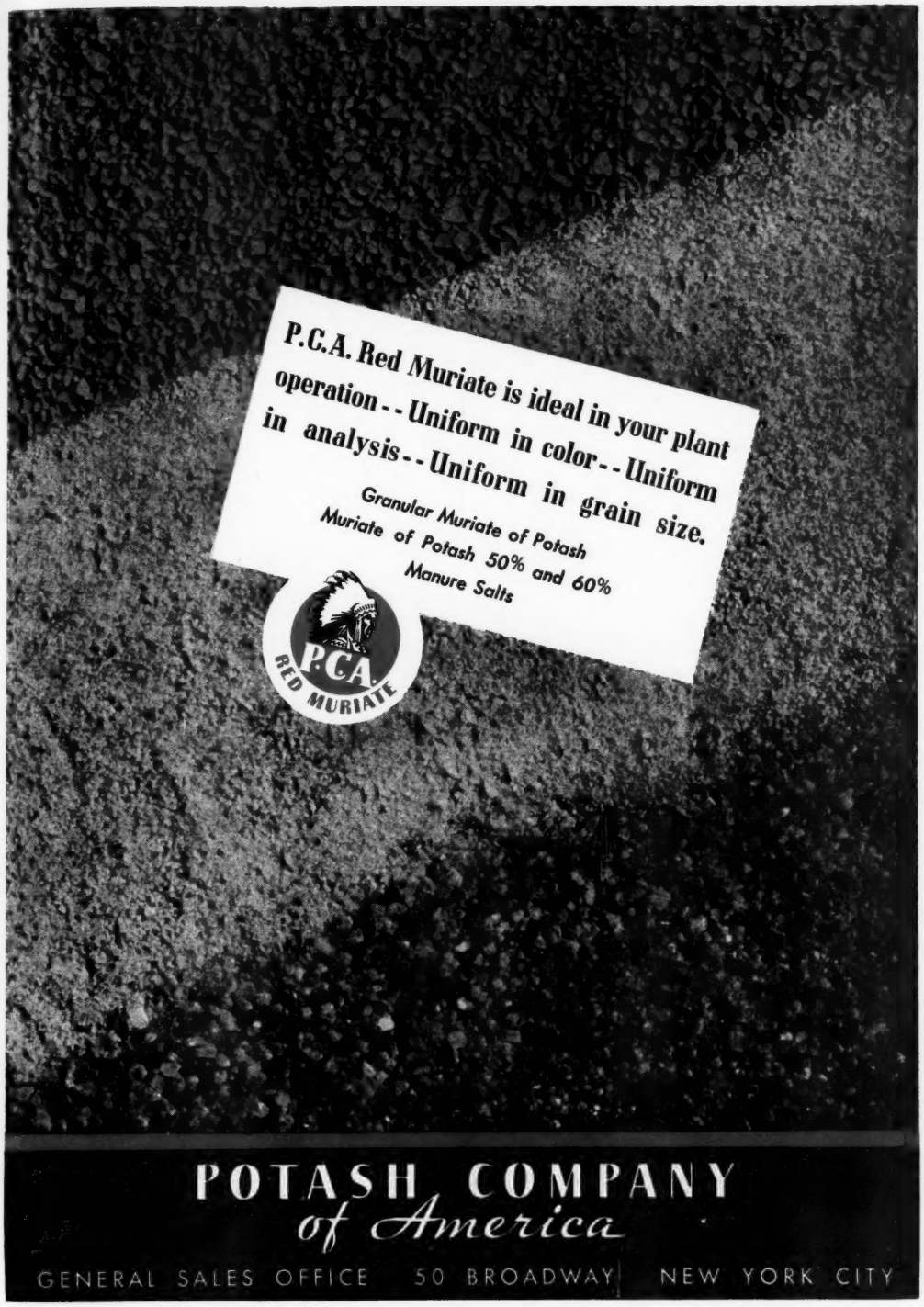
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